DIGITAL ALTERNATING-CURRENT GENERATOR

Technical Field

The present invention relates to a digital alternating-current (AC) generator which is a composite generator incorporating various principles generating current.

Background Art

In general, there are various principles generating current according to movement of magnetism, including the Fleming's righthand rule, the Lentz's law, the Ampere's righthand screw rule, and so on. Existing current generating methods use each of the general current generating principles. When the current generating phenomena occur simultaneously in a single device using the current generating principles, current can be obtained more efficiently.

A coil is needed and movement of magnetism is applied to the coil, in order to generate current. The most effective current generating method is to make magnetism pass through the coil. However, since a magnet cannot penetrate the coil, an iron core is inserted into a space formed by the coil. Then, when a magnet moves in the periphery of the coil, magnetism emitted from the magnet passes through the coil via the iron core, to thereby generate current.

As shown in FIG. 1, electric wire is wound clockwise on an

iron core to form a coil. Then, when a magnet moves, current is generated in the coil. When the N-pole of the magnet moves in an arrow direction 1, magnetism moves along the iron core in the same direction 2 as the magnet movement direction 1. Here, current flows clockwise along the electric wire and passes through the coil, which observes the righthand screw rule. Here, the Fleming's righthand rule is applied in the relationship among the direction 3 of the current flowing in the wire, the direction 4 of the magnetism emitted from the magnet, and the direction 1 of movement of the magnet.

As shown in FIG. 2, when the magnet passes the iron core and becomes far away from the iron core, magnetism moves along the iron core in the opposite direction, which conforms to the Lentz's law.

When the above-described phenomena successively occur, alternating current (AC) is generated. Accordingly, a composite generator incorporating all of the current generating principles such as the Fleming's righthand rule, the righthand screw rule and the Lentz's law is accomplished.

Disclosure of the Invention

To solve the above problems, it is an object of the present invention to provide a digital alternating-current (AC) generating method performed by a composite generator incorporating various

principles generating current.

It is another object of the present invention to provide a digital alternating-current (AC) generator which is a composite generator incorporating various principles generating current.

To accomplish the above object of the present invention, according to the present invention, there is provided a method of generating alternating current (AC) comprising: stacking a plurality of steel plates over each other in the form of a semicircle; winding up a coil around an iron core; and making a magnet rotate at the center in the inner space of the semicircular iron core, wherein the N-pole and S-pole of the magnet are alternatively arranged and become close to or far away from the iron core, to thereby make AC current generated in the coil.

Brief Description of the Drawings

The above and other objects and advantages of the present invention will become more apparent by describing the preferred embodiments thereof in detail with reference to the accompanying drawings in which:

FIG. 1 is a view for explaining current generation according to the Fleming's righthand rule and righthand screw rule;

FIG. 2 is a view for explaining current generation according to the Lentz's law;

FIG. 3 is a plan view showing a silicon steel plate applied

to an iron core in the present invention;

FIG. 4 is a cross-sectional view showing an iron core which is formed of a plurality of silicon steel plates stacked over each other;

FIG. 5 is a plan view of a generator which is designed by incorporating various current generating principles;

FIG. 6 is a view for explaining flows of magnetism and current according to movement of a magnet;

FIG. 7 is another view for explaining flows of magnetism and current according to movement of a magnet;

FIG. 8 is a view for explaining movement of magnetism in the inner and outer sides of the iron core according to movement of the magnet;

FIG. 9 shows a cross-section of the iron core and a shape of the electric wire wound on the iron core;

FIG. 10 is a plan view of a generator using a semicircular iron core and four magnetic poles;

FIG. 11 is a plan view of a generator using two quadrant circular iron cores and eight magnetic poles;

FIG. 12 is a view showing a direction of magnetism which moves in the iron core when four magnetic poles rotate;

FIG. 13 is another view showing a direction of magnetism which moves in the iron core when four magnetic poles rotate;

FIG. 14 is a plan view of a generator using a semicircular

iron core and six magnetic poles;

FIG. 15 is a plan view of a generator using a semicircular iron core and eight magnetic poles;

FIG. 16 is a view showing a direction of magnetism which moves in the iron core when six magnetic poles rotate;

FIG. 17 is another view showing a direction of magnetism which moves in the iron core when six magnetic poles rotate; and

FIG. 18 is a plan view showing a generator provided with an auxiliary iron core.

Best Mode for Carrying out the Invention

Hereinbelow, a digital alternating-current (AC) generator which is a composite generator incorporating various principles generating current, according to the present invention will be described with reference to the accompanying drawings.

FIG. 3 is a plan view showing a silicon steel plate applied to an iron core in the present invention, and FIG. 4 is a cross-sectional view showing an iron core which is formed of a plurality of silicon steel plates stacked over each other. A plurality of semicircular silicon steel plates of FIG. 3 are stacked over each other so that the cross-section of the stacked silicon steel plates becomes a circular shape as shown in FIG. 4, to thereby fabricate an iron core.

FIG. 5 is a plan view of a generator which is designed by

incorporating various current generating principles. As shown in FIG. 5, a coil is wound around the iron core and then a magnet is made to rotate at the center in the space of the inner side of the iron core.

FIG. 6 is a view for explaining flows of magnetism and current according to movement of a magnet. As shown in FIG. 6, when the magnet rotates and thus the N-pole of the magnet passes the iron core in an arrow direction 5, the magnetism emitted from the magnet moves through the iron core in the same direction 6 as the magnet movement direction. In this case, current flows in an arrow direction 7 along the electric wire, according to the Fleming's righthand rule and righthand screw rule. That is, current flows clockwise in the coil wound on the iron core.

FIG. 7 is another view for explaining flows of magnetism and current according to movement of a magnet. As shown in FIG. 7, when the N-pole of the magnet passes the iron core and simultaneously the S-pole enters the iron core, current flows in the opposite direction to the magnet movement direction along the electric wire, according to the Lentz's law. That is, current flows counterclockwise in the coil wound on the iron core. Thus, when the magnet continues to rotate, AC current is generated. In this manner, a digital AC generator is fabricated. However, although a magnet in the generator rotates continuously, instantaneous current is generated but AC current is not generated. Further,

although a rotational speed of the magnet is increased, instantaneous current is generated but AC current is not generated. The present invention has solved such a phenomenon that instantaneous current is generated but AC current is not generated although a magnet in the generator rotates continuously, which will be described below.

Current is generated according to movement of magnetism. When magnetism moves quickly, current flows quickly. That is, the speed of current generated is proportional to the movement speed of magnetism. When an iron core is linear in shape and a magnet moves linearly along the iron core as shown in FIG. 1, magnetism moves linearly in the iron core and thus the magnetism movement speed is same in any portion of the iron core. Also, when an iron core has a semicircular shape and a magnet moves circularly along the shape of the iron core, magnetism moving in the iron core moves circularly along the shape of the iron core. When magnetism emitted from the magnet enters the iron core in linear direction and moves in the iron core, it is predictable that the speed of the magnetism varies at the inner and outer portions of the iron core.

FIG. 8 is a view for explaining movement of magnetism in the inner and outer sides of the iron core according to movement of the magnet. As shown in FIG. 8, when the magnet is made to rotate, the magnetism at the inner portion of the iron core moves from an inner portion 8 to another inner portion 9, and the magnetism

at the outer portion of the iron core moves from an outer portion 10 to another outer portion 11.

Therefore, the magnetism moving at the inner side of the iron core is slower than the magnetism moving at the outer side thereof. Here, it can be seen that current flowing in the outer coil is generated by magnetism moving at the outer side of the iron core, and current flowing in the inner coil is generated by magnetism moving at the inner side of the iron core. Thus, the inner current is slower than the outer current. Since the speed of the current is not same in the outer and inner portions of the coil, mutual interference occurs between the outer current and the inner current, to thereby make a total of current zero so that current does not flow in the coil. In order to solve the above problem, speed of the outer current should balance that of the inner current.

Since the inner current is slower than the outer current, the length of the inner electric wire may be shorter than that of the outer electric wire in order to make the outer current balance the inner current. For this purpose, the cross-section of the iron core should be altered in shape.

FIG. 9 shows a cross-section of the iron core and a shape of the electric wire wound on the iron core. As shown in FIG. 9, the shape in cross-section of the inner portion 12 of the iron core differs from that of the outer portion 13 thereof. Then, when

electric wire 14 is wound around the iron core, the length of the inner electric wire is shorter than that of the outer electric wire. That is, the outer current balances the inner current so that the inner current flows from a portion 16 to another portion 15 during the time when the outer current flows from the portion 15 to the portion 16 of the electric wire. Accordingly, current continues to flow in the coil without causing mutual interference.

In the result of fabricating and testing a number of generators based on the above-described design, it could be confirmed that much current has been generated. Also, the current generated is uniform without variation of voltage.

Here, the iron core is necessarily insulated between the steel plates of the iron core. Since each speed of magnetism varies, each steel plate should be insulated, to thereby prevent mutual interference due to eddy current.

FIG. 10 is a plan view of a generator using a semicircular iron core and four magnetic poles. As shown in FIG. 10, when four magnets where the N-pole and the S-pole are alternately arranged are made to rotate, current is also generated.

FIG. 11 is a plan view of a generator using two quadrant circular iron cores and eight magnetic poles. As shown in FIG. 11, when eight magnets where the semicircular iron core is divided into two pieces of quadrant circular iron cores and the N-pole and the S-pole are alternately arranged are made to rotate, current

is also generated.

When four magnetic poles are made to rotate in the semicircular iron core, one N-pole and one S-pole pass the iron core.

FIG. 12 is a view showing a direction of magnetism which moves in the iron core when four magnetic poles rotate. FIG. 13 is another view showing a direction of magnetism which moves in the iron core when four magnetic poles rotate. As shown in FIG. 12, when the S-pole leads the N-pole, the magnetism direction of the iron core is same as the movement direction of the magnetic pole. As shown in FIG. 13, when the S-pole lags the N-pole, the magnetism direction of the iron core is opposite to the movement direction of the magnetic pole.

When the N-pole and the S-pole alternately go into and out from the iron core, the cases of FIGs. 12 and 13 occur alternately. Thus, magnetism direction is changed and thus the current direction is changed.

FIG. 14 is a plan view of a generator using a semicircular iron core and six magnetic poles, and FIG. 15 is a plan view of a generator using a semicircular iron core and eight magnetic poles. As shown in FIG. 14, six magnetic poles which are alternately arranged may be made to rotate. As shown in FIG. 15, eight magnetic poles which are alternately arranged may be made to rotate.

When the number of the magnetic poles is six and the magnetic poles are made to rotate, the number of the magnetic poles which

pass through the iron core is three. When the magnetic poles rotate, the leading magnetic pole passes over the iron core, the middle magnetic pole moves forward, and the lagging magnetic pole moves to the middle side. Accordingly, a new magnetic pole enters from behind the leading magnetic pole. In this case, the magnetic poles change their counterparts. That is, the lagging magnetic pole moves to the middle side, and forms a pair together with a newly entering magnetic pole, and the middle magnetic pole moves forward and forms a pair together with the magnetic pole which passes over the iron core.

FIG. 16 is a view showing a direction of magnetism which moves in the iron core when six magnetic poles rotate, and FIG. 17 is another view showing a direction of magnetism which moves in the iron core when six magnetic poles rotate. As shown in FIG. 16, one S-pole enters and one N-pole passes over the iron core, the N-pole which passes over the iron core forms a pair together with the S-pole in the iron core. Here, since the movement direction of the N-pole opposes the magnetism direction, the Lentz's law is applied. Here, as shown in FIG. 17, one N-pole enters and one S-pole passes over the iron core, the magnetism direction is changed.

Since the N-pole and the S-pole are alternately arranged, the magnetic poles exchange their counterparts whenever the magnetic poles enter and pass over the iron core. That is, when

the counterpart of one magnetic pole is changed, the magnetism direction is changed. Thus, if two magnetic poles are designed to enter and pass over the iron core simultaneously when the magnetic poles are made to rotate in the structure of the N-poles and the S-poles which are alternately arranged, the magnetism direction is changed and the current direction is also changed. As a result, AC current is generated.

That is, the digital AC generator according to the present invention is made if it is designed so that more than one magnetic pole enters and passes over the iron core simultaneously irrespective of the number of the magnetic poles.

If the number of magnetic poles is two during the time when a rotor appended with a magnet takes a turn, current is changed one time. If the number of magnetic poles is four, current is changed twice. If the number of magnetic poles is six, current is changed three times. If the number of magnetic poles is eight, current is changed four times. If the number of magnetic poles is twelve, current is changed six.

FIG. 18 is a plan view showing a generator provided with an auxiliary iron core. When the number of magnetic poles passing over the iron core is even, that is, when the number of magnetic poles divided into two is even, an auxiliary iron core opposing the iron core reinforces power, as shown in FIG. 18. Also, in the case that a coil is installed on the auxiliary iron core, a much

better effect can be obtained.

Although the present invention has been described only with respect to the above-described embodiments, it is apparent that the present invention can be modified or implemented in various forms within the scope of the appended claim and without departing off from the objects and background of the present invention.

Industrial Applicability

As described above, a digital AC generator according to the present invention is a composite generator incorporating all principles generating current, and thus can obtain more current efficiently than any existing generator which uses each unique generating principle. Also, since current is uniform and changes instantaneously without having an increase or decrease in voltage, the digital AC generator according to the present invention can generate current in digital form.